An Account of the Application of the Gas from Coal to economical Purposes. By Mr. William Murdoch. *Communicated by the Right Hon. Sir* Joseph Banks, *Bart. K.B. P.R.S.* Read February 25, 1808. [*Phil. Trans.* 1808, *p.* 124.]

An apparatus for the production of the gas from coal having been prepared by Mr. Murdoch, for the very extensive cotton manufactory of Messrs. Philips and Lee, at Manchester, which is now illuminated by means of this alone upon a very large scale, this instance was selected as the best for estimating the expense of employing the gas lights.

The quantity of light there employed was ascertained by comparison of the shadows to be equal to that of about 2500 mould candles of six in the pound, each of which consumes about four tenths of an ounce of tallow per hour.

The coal is distilled in large iron retorts, and the gas conveyed by pipes of iron to large reservoirs or gasometers, where it is washed and purified before it is conveyed to the mill. The main pipes branch off into a variety of ramifications (the aggregate length of which amounts to several miles), the several branches diminishing in diameter in proportion as the quantity of gas to be passed through them becomes less.

The burners where the gas is consumed communicate with the main by short pipes, furnished each with a cock to regulate the admission of gas. These burners are of two kinds: one is on the principle of the Argand lamp, and the other has a conical termination with three holes, one at its point, and the other two placed laterally about one thirtieth of an inch in diameter. The former, of which there are 271, are each equal to four candles; and the latter amounting to 633, are each equal to $2\frac{1}{4}$ candles; so that the total amount is, as above stated, about equal to 2500 candles.

For the hourly supply of these burners, 1250 cubic feet of gas are necessary; and since the lights are used for about two hours, the daily consumption of gas is 2500 cubic feet.

For the production of this quantity of gas, seven hundred weight of cannel coal is employed, which, notwithstanding its high price, is found to be the most economical, on account of the superior quality and quantity of the gas it yields. The number of working days being 313, the annual consumption of cannel coal is 110 tons, of which the cost is 125*l.* But these 110 tons yield 70 tons of coke, the value of which is 93*l.*, leaving a difference of 32*l.*, to which must be added 20*l.* for the value of 40 tons of good common coal employed for heating the retorts.

But by far the greatest part of the cost of employing this species of light consists in interest of capital employed in furnishing the apparatus, and in repairing the wear and tear, which are stated together by Mr. Lee at about 550*l.* per annum, making a total annual expenditure of 600*l.* instead of 2000*l.*, which would be required to produce an equal quantity of light from 2500 candles burning together, at 1*s.* per pound.

If the estimate were made upon three hours instead of two per day, it is evident that the comparison would be still more in favour of the gas lights, since the interest of capital would be the same, and the wear and tear not much greater; so that the annual cost might be about 650*l.* instead of 3000*l.*

The introduction of the gas lights into this manufactory has been gradual: at first some inconvenience was experienced from the smell; but this objection has been wholly removed by improved methods of purifying the gas, and it is now much approved by the work-people for the perfect steadiness of the light; and it is wholly free from the inconvenience of snuffing, and from the danger occasioned by sparks that fall from candles.

In addition to the foregoing statement of comparative economy, the author conceives it may be interesting to the Society to be informed of the original application of this gas, as a substitute for oil and tallow, which he states to have put in practice nearly sixteen years, in consequence of experiments which he was at that time conducting at Redruth, in Cornwall, upon the distillation of various mineral and vegetable substances.

It was not, however, till the year 1798, that he removed from Cornwall to the manufactory of Messrs. Boulton and Watt, at the Soho foundery, and there constructed an apparatus on a large scale, for the purpose of lighting their principal building. Since that period it has been extended to the greatest part of their manufactory, to the exclusion of other artificial light; but Mr. Murdoch has preferred collecting his estimate from the apparatus of Messrs. Philips and Lee, on account of the greater extent and greater uniformity of the lights.

Although the author did not derive his information concerning the inflammability of this gas from any source but his own experiments, he has since learned that "the inflammable spirit of coals" is mentioned by Dr. Clayton in the forty-first volume of the Philosophical Transactions, so long since as the year 1739; and he is informed that the current of gas escaping from Lord Dundonald's tar-ovens had been frequently set on fire previous to the date of his experiments: but he thinks himself entitled to claim the original idea of applying it as an economical substitute for oils and tallow for the purpose of illumination.

Further Experiments on the Spleen. *By* Everard Home, *Esq. F.R.S.* Read February 25, 1808. [*Phil. Trans.* 1808, *p.* 133.]

The author having established by the experiments which he lately communicated to the Society, that when the pylorus is closed by a ligature, fluids pass from the stomach into the circulation through the medium of the spleen, has since that time conducted a new course of experiments to determine whether there is the same passage also in the natural state of these parts.

Six asses were the subjects of as many experiments. To the three